

REMARKS

The Office Action dated March 9, 2006 has been carefully considered. Claims 1-7, 10, 12-15, 19 and 20 have been amended. Claims 21-26 have been added. Claims 1-26 are pending in this application. No new matter has been entered.

35 U.S.C. § 112

Claims 1-11 and 13 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the applicant regards as the invention. Specifically, the Office Action indicates that it is unclear how the columns are used in the steps of claim 1. In response, claim 1 is amended to clearly define the sequential steps used in the method. Antecedent basis has been provided for a concentration of maleic acid. Support for this amendment is found throughout the specification and in particular on page 40, line 30 to page 41, line 12.

35 U.S.C. § 102

The previously rejected claims stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,252,110 to Uemura et al. in view of Kirk Othmer. This rejection is traversed. Uemura et al. do not teach key elements recited in the invention as currently claimed.

As noted by the Examiner, Uemura et al. fails to explicitly teach introduction of a polymerization inhibitor to distillation columns and the Examiner has joined Kirk Othmer. However, although Kirk Othmer teaches to feed polymerization inhibitors to the process, it does not teach or suggest introducing a polymerization inhibitor to the azeotropic dehydration column at any point between a point for supplying the aqueous acrylic acid containing solution comprising a point for supplying a reflux and not including the point for supplying the aqueous acrylic acid containing solution material and the point for supplying the reflux by dehydration. Similarly, Uemura et al. do not teach or suggest the point for feeding the polymerization inhibitor.

According to the present invention, the polymerization inhibitors are introduced to a polymerization inhibitor to the azeotropic dehydration column at any point between a point for supplying the aqueous acrylic acid containing solution comprising a point for supplying a reflux

and not including the point for supplying the aqueous acrylic acid containing solution material and the point for supplying the reflux by dehydration except for supplying a reflux as being clear from the step (f) of claim 1. As described on page 25, line 4 to page 26, line 11 of the Specification, "[t]he azeotropic dehydration column 30 prefers proper addition thereto of a polymerization inhibitor for the purpose of preventing acrylic acid from undergoing unwanted polymerization. . . . While water and the solvent are vaporized in the part of the distillation column above the stage for supply, acrylic acid escapes the vaporization and transfers to the bottom side of the column. Thus, the presence of acrylic acid is considered to be effective in preventing the polymerization inhibitor from being precipitated because the acrylic acid entrains the polymerization inhibitor. When the product of the thermal decomposition of the acrylic acid oligomer which will be described specifically herein below is used as the acrylic acid, it serves as an effective utilization of acrylic acid and contributes to the improvement of the productivity. When the acrylic acid is supplied to the azeotropic dehydration column 30, it will be at an advantage in enhancing the quality of product and preventing the polymerization inhibitor from being precipitated. It is inferred that while the by-produced maleic acid, when absorbed in water, is present in the aqueous solution in the form of hydrous maleic acid, it is gradually anhydridized when heated by repeating the work of distillation. Also in the acrylic acid recovered by the thermal decomposition, the water formed by this anhydridization is contained. By circulating this water to the azeotropic dehydration column and dehydrating it therein, therefore, it is made possible to lower the water content in the product. This dehydration process is at a further advantage in preventing the polymerization inhibitor from undergoing precipitation. As described in claim 2, according to this invention, the efficiency of production can be further improved by repressing the concentration of the acrylic acid oligomer (acrylic acid dimer and trimer) in the bottom liquid of the azeotropic dehydration column to a level of not more than 5 wt. %, more preferably to a level of not more than 3 wt. %."

Further, as described on page 28, line 20 to page 29, line 15, "[i]n this invention, the polymerization inhibitor is preferred to be introduced to any of the distillation columns at a stage other than the stage for supply of the raw material or the stage for supply of the reflux. More preferably, a polymerization inhibitor which conforms to the composition of the content of the

column is injected at any of the stages which is present away from the stage for supply of the raw material and before the stage for supply of the reflux.

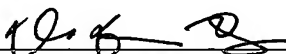
With regard to new claim 26, as described on page 28, line 26 to page 29, line 29, the polymerization inhibitor is supplied in conjunction with the acrylic acid-containing solution by an atomizing means through one or more spraying nozzles disposed in advance in the distilling column. The reason for the atomization is that it enables the solution containing the polymerization inhibitor to be sprayed in a wide range inside the distillation column and allows the polymerization to be prevented effectively.

Thus, it is necessary to feed the polymerization inhibitor to the azeotropic dehydration column 30 in order to inhibit the polymerization of acrylic acid in the column 30 in a specific portion. That is, in order to avoid the escape of the polymerization inhibitor, the polymerization inhibitor is fed between point except the step for supplying the raw material and the point except for supplying the reflux. Therefore, escape of the polymerization inhibitor can be prevented to some extent because of a lot of the solution.

In view of the foregoing, Applicants submit that all pending claims are in condition for allowance and request that all claims be allowed. The Examiner is invited to contact the undersigned should he believe that this would expedite prosecution of this application. It is believed that no fee is required. The Commissioner is authorized to charge any deficiency or credit any overpayment to Deposit Account No. 13-2165.

Respectfully submitted,

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